

Confidential Information



**System Description
Compact Disc Digital Audio**

Subcode/Control and Display System,
Channels R .. W

Chapter 5.8, The CD TEXT mode

Version 1.0

September 1996

SONY

PHILIPS

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Notation

Hexadecimal values are preceded by a \$.

Binary values are preceded by a %.

References

In this document the following standards are referenced :

EBU Tech 3258 (1991)	Specification of the systems of the MAC/packet family
ISO 646 : 1983	Information processing - ISO 7 bit coded character set for information interchange
ISO 3901 : 1986	International Standard Recording Code (ISRC)
IEC 1866	Interactive Text Transmission System (ITTS)
UPC/EAN	Universal Product Code / International Article Numbering Association
RIAJ document	Music Shift JIS Kanji character set
RIS506	
CD EXTRA	Enhanced Music CD, specification version 1.0, December 1995, Sony/Philips

5.8 The CD TEXT mode (MODE = 2, ITEM = 1,2,3,5,6,7 or MODE = 4)

5.8.1 General

Text or data information can be stored in the Lead-In Area and the Program Area.

With this two different applications can be supported :

1. a player which reads information from the Lead-In Area (MODE = 4), stores this in a memory and can be requested to immediately provide this information on a display.
2. a player which reads information during the playback of the audio from the Program Area (Mode = 2). This application does not require a memory, as the requested information can be obtained from the disc. To limit the acquisition times the information is repeated continuously at a certain minimum rate.

The following definitions are used :

Symbol :	a group of 6 bits (R to W), originating from the same 'control and display' symbol.
Subcode Block :	96 successive Symbols immediately following the subcode sync patterns S0 and S1.
Pack :	a group of 24 Symbols, starting at the 1st, 25th, 49th or 73rd Symbol of a Subcode Block
Subcode Packet :	a grouping of 4 successive Packs, the first of which is the first Pack in a Subcode Block
ITTS Packet :	an 48 byte unit as defined in IEC 1866, with an 8 byte header and 40 byte data field

In the case bytes (8 bits) have to be encoded into Symbols (6 bits), four successive Symbols will carry three successive bytes :

Figure 5.8.1 Example of encoding 3 bytes in 4 Symbols

Symbol :	Bit :	R	S	T	U	V	W
N		x7	x6	x5	x4	x3	x2
N + 1		x1	x0	y7	y6	y5	y4
N + 2		y3	y2	y1	y0	z7	z6
N + 3		z5	z4	z3	z2	z1	z0

The bytes are indicated with x, y, and z, with the number indicating the bit position :
7 = MSB, 0 = LSB.

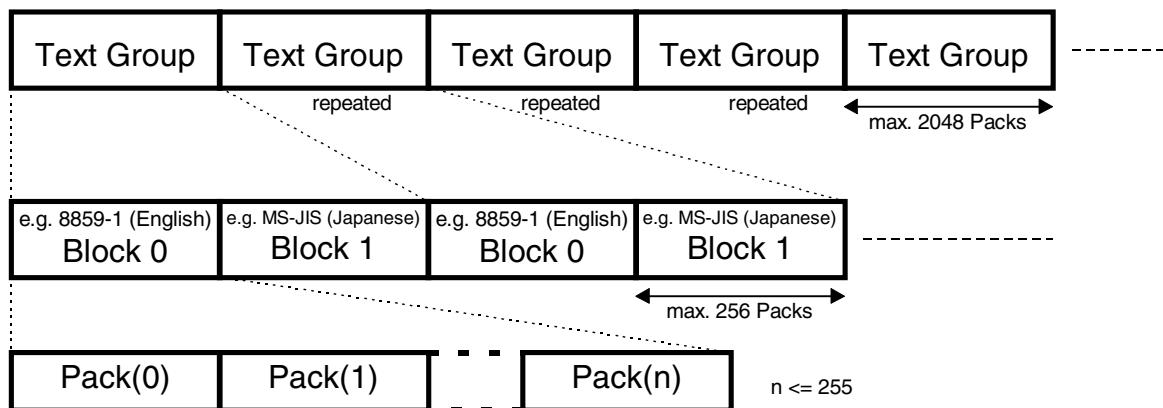
5.8.2 CD TEXT mode for the Lead-In Area (MODE = 4)

5.8.2.1 Text Group and Block

A set of text information representing one particular language is called a Block. A Block can contain up to 256 Packs. Up to 8 Blocks are combined into a Text Group. The size of a Text Group is recommended to be less than 512 Packs, and shall be at maximum 2048 Packs.

Text Groups shall be recorded repeatedly in the Lead-In Area :

Figure 5.8.2 Text Group and Block structure

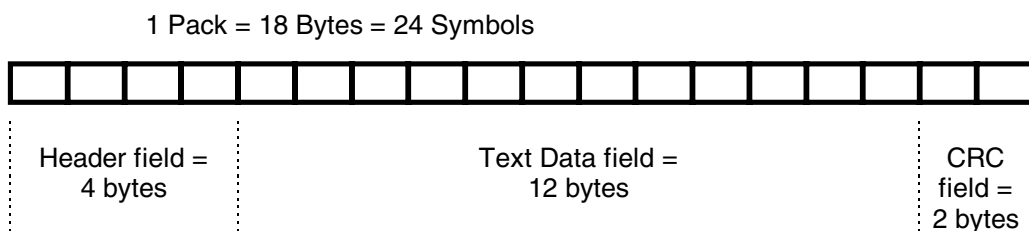


5.8.2.2 CD TEXT Pack format for the Lead-In Area

In the Lead-In Area the interleaving and error correcting code as defined in chapters 5.1.4 up till and including 5.1.9 shall not be used.

A Pack consists of a Header field, a Text Data Field and a CRC field (see figure 5.8.3).

Figure 5.8.3 CD TEXT mode Pack format for the Lead-In Area



5.8.2.2.1 Header field

The Header field consists of 4 Indicator (ID) bytes : ID1 (Pack Type indicator), ID2 (Track Number indicator), ID3 (Sequence Number indicator) and ID4 (Block Number and Character Position indicator).

5.8.2.2.1.1 Description of ID1 (Pack Type Indicator)

ID1 shows the items that are encoded in the Pack. Items are defined as follows :

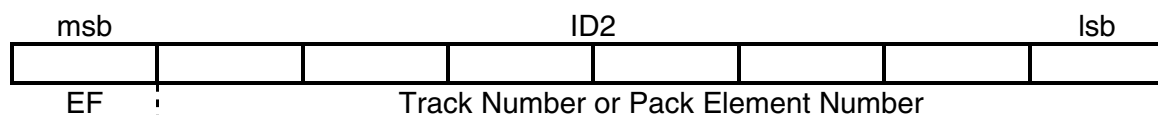
- (\$80) Title of Album name (ID2=\$00) and Track Titles (ID2 = \$01..\$63)
- (\$81) Name(s) of the performer(s) (i.e. singer(s) and/or player(s) and/or conductor(s) and/or the orchestra(s))
- (\$82) Name(s) of the songwriter(s)
- (\$83) Name(s) of the composer(s)
- (\$84) Name(s) of the arranger(s)
- (\$85) Message(s) from content provider and/or artist
- (\$86) Disc Identification information
- (\$87) Genre Identification and Genre information
- (\$88) Table of Content information
- (\$89) Second Table of Content information
- (\$8A) reserved
- (\$8B) reserved
- (\$8C) reserved
- (\$8D) Closed information (for internal use by content provider only)
- (\$8E) UPC/EAN code of the album, and ISRC code of each track
- (\$8F) Size information of the Block

Packs must be encoded in the order of the items listed above.

Note : as the 3 most significant bits of ID1 are %100, this corresponds with an indication of Mode 4 according to 5.1.1.

5.8.2.2.1.2 Description of ID2 (Track Number indicator)

ID2 contains 1 bit of the Extension flag, and 7 bits of either Track Number or Pack Element Number.

**5.8.2.2.1.2.1 Extension flag**

The MSB of ID2 is the Extension flag, and is normally set to %0.

If it is set to %1, the Pack is used for an extended application (to be defined). Players incompatible with an extended application shall discard this Pack.

5.8.2.2.1.2.2 Track Number

The lower 7 bits of ID2 show the Track Number to which the first character of the Text Data field of the Pack (Text1) belongs.

The track number (1 to 99) is expressed in binary code (%0000001 to %1100011).

Track number %0000000 is used for information that represents the whole disc (Album name, main performer, main composer, main message, main songwriter, main arranger, etc.).

Track numbers %1100100 up to and including %1111111 are reserved.

5.8.2.2.1.2.3 Pack Element Number

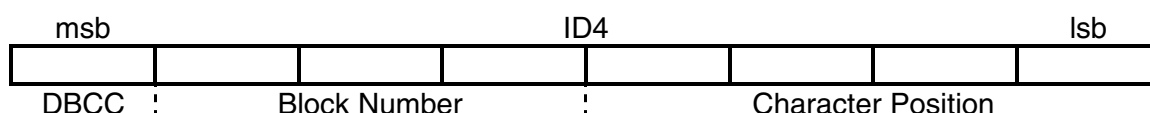
Packs that are independent of the Tracks use the lower 7 bits of ID2 to indicate the Pack Element Number. The use of this field depends on the type of the Pack.

5.8.2.2.1.3 Description of ID3 (Sequence Number indicator)

ID3 contains the Sequence Number of the Pack, numbered incrementally from the first Pack in each Block. The Sequence Number starts at 0 (\$00) and must not exceed 255 (\$FF).

5.8.2.2.1.4 Description of ID4 (Block Number and Character Position indicator)

ID4 contains 1 bit of the Double Byte Character Code indication, 3 bits of the Block Number and 4 bits of the Character Position.



5.8.2.2.1.4.1 Double Byte Character Code indication

The most significant bit of ID4 is the Double Byte Character Code indication.

If a block contains Double Byte Character strings in the Text Data Field of Packs with ID1 = \$80 through \$85, all Packs within the block must have their Double Byte Character Code indication set to %1.

In all other cases it shall be set to %0 to indicate a Single Byte Character Code is used.

5.8.2.2.1.4.2 Block Number

The next 3 bits of ID4 contain the Block Number of the Block to which the Pack belongs. Block Number is numbered incrementally from 0 from the first Block within each Group.

5.8.2.2.1.4.3 Character Position

The least significant 4 bits of ID4 contain the Character Position. The position of the first character of the Text Data field (Text1) is counted from the first character of its string. The Character Position starts from 0, and if the position exceeds 15, 15 shall be encoded.

When the character code is a double byte code, a set of 2 bytes in the Text Data field (i.e. each double byte character) is counted as one.

A null code is also counted as a character, when obtaining the Character Position.

Character Position is not used in Packs with ID1 = \$88, \$89 or \$8F, and %0000 should be used in all of these Packs.

5.8.2.2.2 Text data field

A Text Data field consists of 12 bytes, and either contains character strings or binary information depending on the type of Pack.

5.8.2.2.2.1 Character String information

All Packs except Packs with Table of Content information (ID1 = \$88), Second Table of Content information (ID1 = \$89) or Size information (ID1 = \$8F) shall incorporate character strings in the Text Data field.

If Packs with ID1=\$80 through ID1=\$85 and ID1=\$8E are used, a character string for each track (from the first track up to the last) should be provided.

A character string consists of a character sequence, and a terminator. The character sequence may be omitted if a character string does not contain any relevant information. The terminator may not be omitted, however.

The terminator is a null (\$00) code for single byte characters codes, and two null codes for double byte character codes.

The size of a character string is recommended to be less than 160 bytes.

If a character string does not fit in a Text Data field of a Pack, it is continued onto the succeeding Packs. The succeeding character string (with the same ID1) will be encoded starting at the next byte in the Text Data field after the terminator of the current string.

Unused bytes in the Text Data field (following the terminator of the final character string within the same information category) shall be filled with null codes (\$00).

In case the same character string is used for consecutive tracks, the 'Tab Indicator' may be used to represent 'same as previous track'.

The Tab Indicator is a single 'tab' code (\$09) for single byte character codes, and a set of two tab codes for double byte character codes.

A Tab Indicator shall be followed by a terminator.

Tab Indicators shall only be used in Packs with ID1=\$80 through \$85, and shall not be used for the first track, nor for a track of which the previous track information does not contain any character information (i.e. is a null string).

Example : (_ indicates a space, X is unknown/don't care, SN = Sequence Number)

ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$8X	\$00	SN	\$X0	S	T	R	I	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
N	_	1	\$00	S	T	R	I	
ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$8X	\$01	SN+1	\$X4	N	G	_	2	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
\$00	S	T	R	I	N	G	_	
ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$8X	\$03	SN+2	\$X7	3	\$00	S	T	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
R	I	N	G	_	4	\$00	\$00	

5.8.2.2.2 Binary information

Packs that contain Disc ID, Genre ID, TOC, Second TOC and Size information (ID1 = \$86, \$87, \$88, \$89 or \$8F) incorporate binary information in the Text Data field. The allocation of the binary information depends on the type of Pack.

5.8.2.2.3 CRC field

A Cyclic Redundancy Checksum (CRC) field consists of 2 bytes, msb first, and is used to check errors in the R to W channels in the Lead-In Area.

The CRC polynomial is $X^{16} + X^{12} + X^5 + 1$. All bits shall be inverted.

5.8.2.3 CD TEXT Application in the Lead-In Area

5.8.2.3.1 Title, Name and Message information (ID1 = \$80 through \$85)

Packs with ID1 equal to \$80 through \$85 can be used to encode Textual information about Album name and Track titles, Names and Message information as indicated in 5.8.2.2.1.1 .

When ID2 equals \$00, the Text Data field contains information that represents the whole disc (see 5.8.2.2.1.2.2)

5.8.2.3.2 Disc ID Information (ID1 = \$86)

The Text Data field of the Pack with ID1 = \$86 shall contain Disc ID information, such as the catalog number and the name of the record company, point of sale code, year of sales etc. Each of these shall be separated by a slash ("/").

The Pack Element Number (ID2) shall be encoded as \$00.

Only the 8859-1 (modified) character code shall be used for this item (see 5.8.2.3.8)

ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$86	Pack Element = \$00	Sequence Number	\$X0	C	A	T	A	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
L	O	G	\$20 [space]	N	U	M	B	
ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$86	Pack Element = \$00	Sequence Number + 1	\$XC	E	R	\$00	\$00	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
\$00	\$00	\$00	\$00	\$00	\$00	\$00	\$00	

5.8.2.3.3 Genre information (ID1 = \$87)

The Text Data field of the Pack with ID1 = \$87 shall contain Genre information.

The Genre Code is the same as defined in chapter III.3.2.5.3.8 of the CD EXTRA Specification. It will be encoded as a 2 byte entry, with the most significant byte first, in the first 2 bytes of the Text Data field.

The supplementary description of the genre may be appended.

The Pack Element Number (ID2) shall be encoded as \$00.

ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$87	Pack Element = \$00	Sequence Number	\$X0	Genre Code Upper Byte	Genre Code Lower Byte	S	U	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
P	P	L	E	M	E	N	T	
ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$87	Pack Element = \$00	Sequence Number + 1	\$XA	A	R	Y	\$20 [space]	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
I	N	F	O	\$00	\$00	\$00	\$00	

5.8.2.3.4 Table of Contents information (ID1 = \$88)

The Track Start times or Pointers, as encoded in the subcode Q channel in the Lead-In Area, may also be encoded in CD TEXT Packs with ID1 = \$88.

The pointers are expressed in the order of minutes, seconds and frames, in the same way as encoded in the subcode Q channel.

All values will be expressed in binary code.

If ID2 = \$00, the Text Data field contains the First Track Number (A0), Last Track Number (A1) and start of the Lead-Out Area (A2) :

ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$88	Pack Element = \$00	Sequence Number	Block Number	First Track Number	Last Track Number	Reserved (\$00)	Lead-Out (Minutes)	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
Lead-Out (Seconds)	Lead-Out (Frames)	Reserved (\$00)	Reserved (\$00)	Reserved (\$00)	Reserved (\$00)	Reserved (\$00)	Reserved (\$00)	

If ID2 <> \$00, the Text Data field contains Pointers to tracks :

ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$88	Pack Element = Track No. N	Sequence Number	Block Number	Track N (Minutes)	Track N (Seconds)	Track N (Frames)	Track N+1 (Minutes)	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
Track N+1 (Seconds)	Track N+1 (Frames)	Track N+2 (Minutes)	Track N+2 (Seconds)	Track N+2 (Frames)	Track N+3 (Minutes)	Track N+3 (Seconds)	Track N+3 (Frames)	

Unused Pointers to a track shall be filled with null (\$00) codes.

The Pack Element Number shall represent the Track Number of the track pointed to by the pointer in Text1, Text2 and Text3. As such it shall be encoded in ascending order, incremented by 4 with every next Table of Contents Pack.

5.8.2.3.5 Second Table of Contents information (ID1 = \$89)

The second Table of Contents information indicates specific intervals in the Program Area (e.g. alternative scan passages of the disc can be indicated). The intervals are expressed in the order of track number (ID2) and start and end time in absolute time (minutes, seconds and frames).

Such intervals can start in one track, and end in another.

One Pack can contain information about one such interval.

All entries will be encoded in binary code.

The intervals are also given a Priority Number.

The Packs should be recorded in the order of the Priority Number. As a result, the Priority Number is encoded incrementally from 1 up to the number of intervals : the interval to be played first is given Priority Number \$01. The next priority is \$02, etc.

ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	
\$89	Track Number	Sequence Number	Block Number	Priority Number	Number of intervals	Reserved (\$00)	Reserved (\$00)	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	CRC
Reserved (\$00)	Reserved (\$00)	Start Point (Minutes)	Start Point (Seconds)	Start Point (Frames)	End Point (Minutes)	End Point (Seconds)	End Point (Frames)	

5.8.2.3.6 Closed information (ID1 = \$8D)

Information such as manufacturing control or memorandum may be recorded using this Pack. The information will not be shown nor read by players available to the public. Closed information is recorded as character strings that represent the whole disc and each individual track (see 5.8.2.2.2.1).

5.8.2.3.7 UPC/EAN and ISRC information (ID1 = \$8E)

These Packs contain the UPC/EAN (POS Code) of the album and the ISRC code of each of the tracks. The UPC/EAN and ISRC codes are recorded as character strings (see 5.8.2.2.2.1).

The UPC/EAN code typically consists of 13 bytes and should be recorded as Track 0.

The ISRC code typically consists of 12 bytes, and should be recorded as information representing each of the tracks.

5.8.2.3.8 Size information (ID1 = \$8F)

Three Packs with ID1 = \$8F contain the Character Code, First Track Number, Last Track Number, Copy Protection Flags, the Number of Packs in the Block with respect to each Pack Type, Number of Packs and Language Code information of each Block.

All values will be expressed in binary code.

ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	CRC
\$8F	Pack Element = \$00	Sequence Number	Block Number	Character Code for this Block	First Track Number	Last Track Number	Mode 2 & Copy Protection Flags	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	
Number of Packs with ID1 = \$80	Number of Packs with ID1 = \$81	Number of Packs with ID1 = \$82	Number of Packs with ID1 = \$83	Number of Packs with ID1 = \$84	Number of Packs with ID1 = \$85	Number of Packs with ID1 = \$86	Number of Packs with ID1 = \$87	
ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	CRC
\$8F	Pack Element = \$01	Sequence Number	Block Number	Number of Packs with ID1 = \$88	Number of Packs with ID1 = \$89	Number of Packs with ID1 = \$8A	Number of Packs with ID1 = \$8B	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	
Number of Packs with ID1 = \$8C	Number of Packs with ID1 = \$8D	Number of Packs with ID1 = \$8E	Number of Packs with ID1 = \$8F	Last Sequence Number Block 0	Last Sequence Number Block 1	Last Sequence Number Block 2	Last Sequence Number Block 3	
ID1	ID2	ID3	ID4	Text1	Text2	Text3	Text4	CRC
\$8F	Pack Element = \$02	Sequence Number	Block Number	Last Sequence Number Block 4	Last Sequence Number Block 5	Last Sequence Number Block 6	Last Sequence Number Block 7	
Text5	Text6	Text7	Text8	Text9	Text10	Text11	Text12	
Language Code Block 0	Language Code Block 1	Language Code Block 2	Language Code Block 3	Language Code Block 4	Language Code Block 5	Language Code Block 6	Language Code Block 7	

The Character Code is defined as follows :

\$00	= ISO 8859-1 (modified, see CD EXTRA specification, appendix 1)
\$01	= ISO 646, ASCII (7 bit)
\$02 .. \$7F	= reserved
\$80	= Music Shift-JIS Kanji
\$81	= Korean Character Code (to be defined)
\$82	= Mandarin Chinese Character Code (to be defined)
\$83 .. \$FF	= reserved

The Character Code indicates the character set used to code the character strings of the Packs with ID1 = \$80 through \$85. Other Packs shall have Character Code \$00 (ISO 8859-1 modified). All Blocks which use 8859-1 (modified) or ASCII Character Code (as indicated by Text1 in the first Size Pack) shall have a smaller Block Number (see 5.8.2.2.1.4.2) than Blocks which incorporate other Character Codes.

Mode 2 & Copy Protection Flags:

msb				lsb			
Mode 2	PA C.P.	Res.	Res.	Res.	LI C.P.2	LI C.P.1	LI C.P.0

The Mode 2 flag indicates whether or not Mode 2 CD TEXT Packets are encoded in the Program Area : if set to %1 then Mode 2 Packets are available, otherwise set to %0.

The Program Area Copy Protection (PA C.P.) flag indicates whether or not additional information is available in the Program Area (see 5.8.3.2.1.1) about the copy right assertion of specific items : if set to %1 then such information is available, if set to %0 such information is unavailable and copyright is asserted for all CD TEXT information in the Program Area. This bit shall be set to %0 if the Mode 2 flag is set to %0.

The Reserved bits are set to %0.

The Copy Protection flags (LI C.P.0 through LI C.P.2) refer to Lead In Area CD TEXT information in the current Block only: they indicate whether or not copyright is asserted for the following Pack types:

LI C.P.2	Copyright asserted for Message(s) (i.e. Packs with ID1=\$85)
LI C.P.1	Copyright asserted for Name(s) of performers, songwriters, composers and arrangers. (i.e. Packs with ID1=\$81 through \$84)
LI C.P.0	Copyright asserted for Album Name and Track Titles. (i.e. Packs with ID1=\$80)

If the bit is set to %1 copyright is asserted, if set to %0 no copyright is asserted.

The Language Code is encoded as specified in Annex 1 to Part 5 of EBU Tech 3258-E (1991).

A Last Sequence Number equal to \$00 indicates that the Block does not exist.

5.8.3 CD TEXT mode for the Program Area (MODE = 2)

Text or data information arranged as PACKETs according to the Interactive Text Transmission System (ITTs), as defined in IEC 1866, can be carried in the PACKs.

5.8.3.1 CD TEXT Pack format for the Program Area

The CD TEXT Pack format for the Program Area is identical to the Pack format as defined in chapter 5.1, except for the interleaving (chapter 5.1.4) : the Symbols of successive Packs may either be interleaved or not.

Figure 5.8.4 CD TEXT mode Pack format for the Program Area

	Bit :	R	S	T	U	V	W
0		0	1	0	Item		
1		Instruction					
2		Parity Q0					
3		Parity Q1					
4		Data field					
...							
19							
20		Parity P0					
21		Parity P1					
22		Parity P2					
23		Parity P3					

The Item field of the Pack will indicate the Data field contents, as well as the Pack interleave state :

Interleaved :		Item	
Pack in Subcode Packet :		U V W	
1		0 0 1	ITTs Packet start
2, 3		0 1 0	ITTs Packet continuation
4		0 1 1	ITTs Packet continuation and end

Non-interleaved :		Item	
Pack in Subcode Packet :		U V W	
1		1 0 1	ITTs Packet start
2, 3		1 1 0	ITTs Packet continuation
4		1 1 1	ITTs Packet continuation and end

The Instruction field will be undefined, with no relevant information for the decoder. It will be encoded as \$00.

5.8.3.1.1 DATA FIELD contents

The 48 bytes of the ITTS Packet, numbered 0 to 47, will be distributed as follows :

Pack in Subcode Packet :	ITTS Packet bytes
1	0 to 11
2	12 to 23
3	24 to 35
4	36 to 47

5.8.3.1.2 Interleave mode and partial interleave

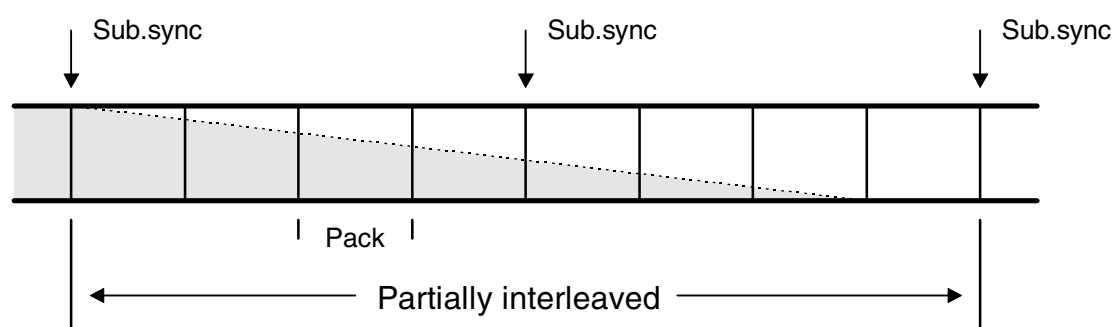
In the case no interleaving is applied, the P and Q error correction parity will still be encoded, but no Symbol permutation or delay is applied.

Whether the Symbols of a Pack are interleaved or not will be indicated in the Mode and Item field of Symbol 0 (for codes see 5.8.3.1). Optional additional information, as defined in chapter 5, shall always be encoded according to the interleaved Pack format.

Changes in the interleaving of Packs shall only occur at subcode sync boundaries.

When changing from interleaved to non-interleaved Packs, or from non-interleaved to interleaved Packs, a transition has to be made, in which the Packs will be partially interleaved (see figure 5.8.5). This is caused by the delays in the interleaving scheme, which delay Symbols by a maximum of 7 Packs.

Figure 5.8.5 Example of partial interleaving of Packs



The transition will be in 2 successive Subcode Blocks.

When changing from interleaved to non-interleaved the final Pack of the previous Subcode Block will be the last interleaved Pack. Symbols of this Pack will be encoded onto disc with a delay of up to 7 Packs. The symbols in the transition Packs which are not carrying information from the last interleaved Pack will be set to '0'. The first Pack of the next Subcode Block will be the first with non-interleaved Pack information.

When changing from non-interleaved to interleaved the final Pack of the previous Subcode Block will be the last non-interleaved Pack. The first Pack of the transition will be interleaved. Symbols of this Pack will be encoded onto disc with a delay of up to 7 Packs. The symbols in the transition Packs which are not carrying information from the interleaved Packs will be set to '0'.

5.8.3.2 CD TEXT Application in the Program Area

In this section all references to 'Packets' should be read as 'ITTS Packets'.

5.8.3.2.1 Additionally defined packet structures

5.8.3.2.1.1 Static TOC Data packet

In addition to the DATA packet DATA types defined in IEC 1866, a new DATA type can be used:

DATA Type	Contents
%00101	Static TOC information

The header of the Static TOC information DATA packets shall contain :

Language number	%000	
Application item	%0111	
Packet Index	\$0000	
MMC	\$00	
SMC	\$00	
CDS & CDE	%10	first TOC Data packet
	%01	last TOC Data packet
	%00	any other TOC Data packet
ICI	%00	TOC data the same for entire volume

Byte 7 of the header indicates the kind of TOC Data :

\$00	Volume TOC Data
\$01	Track TOC Data (for 2 tracks)
\$02	Additional Copyright information for Packets with Packet Index not equal to \$0000
\$03	Additional Copyright information for Packets with Packet Index equal to \$0000

All other values of Byte 7 are reserved for future use.

5.8.3.2.1.1.1 Volume TOC Data

Volume TOC Data may be encoded in one Static TOC Data packet with byte 7 of the header equal to "\$00".

The bytes of the Data field shall contain information as follows :

Byte	Contents
8	Total number of TOC Data entries
9	\$00 = Volume information.
10,11,12	Interval Scan mode Start Time (min:sec:fr), binary coded (see 5.8)
13,14	Volume genre, according to the Genre Code as defined for CD EXTRA
15	Total number of tracks
16..28	UPC/EAN code, if not used all = \$00
29	First Track Number
30	Last Track Number
31,32,33	Alternative Interval Scan mode Start time (min:sec:fr), binary coded (see 5.8)
34	Maximum sequence number for Interval Scan (see 5.8)
35	Maximum sequence number for Alternative Interval Scan mode (see 5.8)
36	Additional Copyright Information flag : if set to \$01 then Additional Copyright Information is available, if set to \$00 such information is unavailable and copyright is asserted for all CD TEXT information in the Program Area.
37..47	Reserved for future use, to be encoded as \$00 if no function has been defined

5.8.3.2.1.1.2 Track TOC Data

Track TOC Data may be encoded in Static TOC Data packets with byte 7 of the header equal to "\$01".

The 40 bytes of the Data field shall contain two Track TOC Data entries, each with a length of 20 bytes. The first Track TOC Data entry shall be located in bytes 8 to 27, the second one in bytes 28 to 47 :

Byte	Byte	Contents
8	28	TOC Data entry number, count down, binary coded
9	29	Track number, binary coded. The MSB holds the audio copy control bit ("0" = not copy protected, "1" = copy protected)
10,11,12	30,31,32	Track Start Time (min:sec:fr), binary coded
13,14	33,34	Track genre, according to the Genre Code
15	35	Alternative Sequence Number, if not in sequence then \$00
16..27	36..47	ISRC (if not used then all \$00)

The Lead-Out Area shall be encoded with the following values :

Byte	Byte	Contents
8	28	TOC Data entry number = \$00 (final entry)
9	29	Track number = \$FF
10,11,12	30,31,32	Lead Out Start Time (min:sec:fr), binary coded
13,14	33,34	Track genre = \$0000
15	35	Highest Alternative Sequence Number
16..27	36..47	ISRC = all \$00

If the Lead-Out Area TOC Data Area is encoded in bytes 8 to 27, bytes 28 to 47 shall contain \$00.

5.8.3.2.1.1.3 Additional Copyright Information

Additional Copyright Information may be encoded in Static TOC Data packets with byte 7 of the header equal to "\$02" (for Packets with Packet Index not equal to \$0000) or "\$03" (for Packets with Packet index equal to \$0000).

For every Sub Message Channel number one bit represents the copyright status : if set to %1 copyright is asserted, if set to %0 copyright is not asserted.

The Sub Message Channel number \$02 refers to Runtime Menu Packets.

The location of the bit for Sub Message Channel n ($0 \leq n \leq 255$) in the Packet can be found with the following formulae :

Byte : $8 + (n \text{ div } 8)$

Bit : $n \text{ mod } 8$ (7 = MSB, 0 = LSB)

The remaining bytes (40 through 47) in the Packet are reserved for future use, and shall be encoded as \$00 until otherwise defined.

In case no Additional Copyright Information is encoded, copyright is asserted for all CD TEXT information in the Program Area.

5.8.3.2.1.2 Database packet

In addition to the packet types defined in IEC 1866, a new DATABASE type may be used. The structure is based on that of the TEXT packets.

The header of the DATABASE packets shall contain :

Language number	%000	or language dependent
Application item	%1100	indicating this new DATABASE packet
Packet Index	\$0000	or as defined in IEC 1866
Byte 3	Track Number	will indicate the Track Number to which the information refers. If \$00 then it is valid for the entire volume.
Byte 4	Item Code	will indicate the kind of information that is encoded in the TEXT body (see below)
Byte 5	Sequence Number	count down (for CDS = 1 the highest sequence number shall be encoded), binary coded
ICP	%0	TOC data the same for entire volume
SA	%000	
TCI	%00	
CDS & CDE	%10	first DATABASE packet
	%01	last DATABASE packet
	%00	any other DATABASE packet
	%11	only allowed if just one DATABASE packet is available
Character set		as defined in IEC 1866
Item Code :		
	\$00	Reserved
	\$01	Track Title
	\$02	Performer(s)
	\$03	Songwriter(s)
	\$04	Composer(s)
	\$05	Arranger(s)
	\$06	Personal Message(s)
	\$07	Disc identification description
	\$08	Keyword(s) or string for sorting purposes
	\$09 .. \$FF	Reserved

The information is encoded as plain TEXT in the packet body (Bytes 8..47), without display control information.

5.8.3.2.2 Additionally defined interactive commands

5.8.3.2.2.1 Scan mode coding

Special interactive commands for scan functions can be encoded. In addition to scan modes defined in the player, the disc may provide a player with information to perform

- 'Interval Scan' : specific parts of tracks, indicated as 'Intervals';
- 'Alternative Interval Scan' : specific parts of tracks, as an alternative to the 'Interval Scan';
- 'Menu Controlled Scan' : scanning the disc for parts as identified in a menu.

The header of the DATA packets with scan information shall contain :

Language number	%000	Language independent
Application item	%0111	DATA packet
Packet Index	\$0000	Decode immediately
MMC	\$00	
SMC	\$00	
DATA type	%00010	Interactive commands
CDS & CDE		as defined in IEC 1866
ICI	%00	Interactive Commands the same for entire volume

Byte 7 will be "\$00".

The interactive command with the scan mode information shall have the following structure:

Byte	Value	Explanation	Comment
0,1		\$0000 or associated Packet Index	Execute when activated or link with menu text line
2	\$04	IC4 = scan mode reference	New interactive command for this application
3		Scan mode identification, binary coded	0 = no scan 1 = Interval Scan 2 = Alternative Interval Scan 3 = Intro scan 4 = Alternative Intro Scan 5 .. 255 = Menu Topic Scan
4		Scan sequence countdown number, binary coded	indicates current sequence number, starting with the maximum sequence number (see 5.8.3.2.1.1.1) and counting down with every sequence
5		Jump time minutes, binary coded	MSB = %0 : start time of current sequence MSB = %1 : end time of current sequence
6		Jump time seconds, binary coded	
7		Jump time frames, binary coded	

If applied, associated Interactive Commands will be encoded at least during the scan sequences.

5.8.4 Mandatory, recommended and optional items

It is optional to encode a Compact Disc according to the extended specification in this chapter 5.8 of the System Description Compact Disc Digital Audio. However, if it is encoded accordingly, it shall contain CD TEXT packs in the Lead-In Area, and may contain CD TEXT information in the Program Area according to the following rules :

5.8.4.1 Lead-In Area

In the Lead-In Area of a CD TEXT disc the following items are mandatory or recommended :

ID1	status	contents
\$80	mandatory	Title of Album name (ID2 = \$00) and Track Titles (ID2 = \$01..\$63)
\$81	recommended	Name(s) of the performer(s)
\$86	recommended	Disc Identification information
\$8F	mandatory	Size information

Other items are optionally encoded.

5.8.4.2 Program Area

It is recommended to encode CD TEXT information in the Program Area, in which case it is mandatory to encode non-interleaved Packs in the R .. W subcode channels. The Packs will contain ITTS Packets.

In addition it is allowed to optionally encode :

- interleaved Packs with ITTS Packets. In this case this will be an additional information structure, completely separate from the information in the non-interleaved Packs.
- interleaved Packs with other information, as specified in chapter 5 of the Compact Disc Digital Audio specification.

The information in the Program Area can be dynamic, i.e. it is possible to update specific items at any moment during the playback, because a continuous flow of information can be encoded in parallel to the audio program.

If applied in the Program Area, the following items are mandatory or recommended :

MMC	SMC	status	contents
\$01	\$01	mandatory	Volume (Album) Title
\$01	\$02	mandatory	Runtime Menu (= Track Titles)
\$01	\$03	recommended	Credits (= names of singer(s) etc.)
\$01	\$FF	mandatory	Main Menu (with associated interactive commands)

The Volume title plus any related information shall be encoded in at least one Text Packet with Application Item = "%1000".

The sequence of Runtime Menu Packets shall contain at least one Packet with the Track Title of each of the Tracks recorded on the disc. This shall be coded with the Runtime Menu Segment Number equal to the Track number, and the Runtime Menu Sub-segment Number equal to "\$01".

Additional information may optionally be encoded, as defined in IEC 1866 or this specification.

5.8.5 Repetition rate and skew

5.8.5.1 Lead-In Area

A complete sequence of CD TEXT Mode 4 Packs, organized as Blocks within a Text Group, shall be recorded sequentially. Text Groups shall be repeated continuously up to the end of the Lead-In Area, and may be terminated at any Pack.

5.8.5.2 Program Area

If applied, CD TEXT Mode 2 Packs containing ITTS packets shall be recorded in the Program Area at least with a average rate of 25 packets per second. At least 75 packets shall be recorded in every section of 5 seconds.

5.8.5.3 Mode transition skew

The mode transition skew is defined as the offset after decoding, expressed in Subcode Sync periods, from the Subcode Q-channel frame with the "running time on the disc" time equal to "00:00:00" (start of the Program Area), to the first Subcode Block with the first Program Area CD TEXT mode information (mode 2).

The reference point for the Subcode Q-channel frame is the start of the Subcode Q-channel sync S0 after demodulation and sync extraction with minimum delay. Only the minimum required delay of the Subcode Q-channel frame data is calculated for the reference point.

The reference point for the Subcode Block with the first Program Area CD TEXT mode information is the start of the Subcode Sync S0 after demodulation and sync extraction with minimum delay. Only the minimum required delay of the Subcode channel data is calculated for the reference point.

The maximum allowed mode transition skew is limited to the range from 0.0 to +8.0 Subcode Sync periods, where the Subcode Sync of the Subcode Block with the first Program Area CD TEXT mode information has to occur at the same time as or later than the Subcode Sync of the Q-channel frame with "running time on the disc" equal to "00:00:00" (see figure 5.8.6). Subcode Blocks before this point shall carry Lead In Area CD TEXT mode information.

Figure 5.8.6 Maximum allowed mode transition skew

